

WHAT IS CLAIMED IS:

Seb A

1. A semiconductor laser device comprising:
a first nitride based semiconductor layer including an
active layer and containing at least one of boron, aluminum,
gallium, indium and thallium;
a current blocking layer, formed on said first nitride
based semiconductor layer, having a striped opening; and
a second nitride based semiconductor layer, formed on
said first nitride based semiconductor layer in said striped
opening, containing at least one of boron, aluminum, gallium,
indium and thallium, wherein
said current blocking layer includes a multilayer
structure of at least one first layer of a nitride based
semiconductor containing at least one of aluminum and boron
and at least one second layer of a nitride based semiconductor
containing indium and having a smaller band gap than said first
layer.

2. The semiconductor laser device according to claim 1,
wherein
said at least one first layer has a larger aluminum
composition ratio than that of said at least one second layer
or a larger boron composition ratio than that of said at least
one second layer, and

said at least one second layer has a larger indium composition ratio than that of said at least one first layer.

3. The semiconductor laser device according to claim 1,
5 wherein

said first nitride based semiconductor layer includes a first conductivity type cladding layer, said active layer and a second conductivity type first cladding layer in this order, and

10 said second nitride based semiconductor layer includes a second conductivity type second cladding layer.

4. The semiconductor laser device according to claim 1,
wherein

15 said at least one first layer includes at least two first layers, and said at least two first layers and said at least one second layer are alternately stacked.

5. The semiconductor laser device according to claim 1,
20 wherein

the mean refractive index of said current blocking layer is smaller than the refractive index of said second nitride based semiconductor layer in said striped opening.

25 6. The semiconductor laser device according to claim 5,

wherein

the thickness of each of said at least one first layer is larger than the thickness of each of said at least one second layer.

5

7. The semiconductor laser device according to claim 3,
wherein

the mean band gap of said current blocking layer is larger than the band gap of said second conductivity type second cladding layer.

8. The semiconductor laser device according to claim 7,
wherein

15 said active layer includes at least one quantum well layer
and at least two quantum barrier layers alternately stacked,
and

the band gap of said at least one second layer is larger than the band gap of said at least one quantum well layer.

20 9. The semiconductor laser device according to claim 3,
wherein

said active layer contains indium, gallium and nitrogen,
 said at least one first layer contains at least one of
aluminum and boron as well as gallium and nitrogen,
 said at least one second layer contains indium, gallium

and nitrogen, and

5 said first conductivity type cladding layer, said second conductivity type first cladding layer and said second conductivity type second cladding layer contain aluminum, gallium and nitrogen.

10. The semiconductor laser device according to claim 9, wherein

10 said at least one first layer has a larger aluminum composition ratio than that of said second conductivity type second cladding layer or a larger boron composition ratio than that of said second conductivity type second cladding layer.

11. The semiconductor laser device according to claim 9, wherein

15 said active layer includes at least one quantum well layer containing indium, gallium and nitrogen and at least two quantum barrier layers containing indium, gallium and nitrogen, alternately stacked, and the indium composition ratio of said 20 at least one quantum well layer is larger than the indium composition ratio of said at least two quantum barrier layers.

12. The semiconductor laser device according to claim 1, wherein

25 the mean band gap of said current blocking layer is

substantially equal to or smaller than the band gap of said active layer.

13. The semiconductor laser device according to claim
5 12, wherein

said active layer includes at least one quantum well layer and at least two quantum barrier layers alternately stacked, and

the mean band gap of said current blocking layer is
10 substantially equal to or smaller than the mean band gap of said active layer.

14. The semiconductor laser device according to claim
13, wherein

15 the band gap of said at least one second layer is smaller than the band gap of said at least one quantum well layer.

16. The semiconductor laser device according to claim
14, wherein

20 said active layer contains indium, gallium and nitrogen, said at least one first layer contains at least one of aluminum and boron as well as indium, gallium and nitrogen, said at least one second layer contains indium, gallium and nitrogen, and

25 said first conductivity type cladding layer, said second

conductivity type first cladding layer and said second conductivity type second cladding layer contain aluminum, gallium and nitrogen.

5 16. The semiconductor laser device according to claim 15, wherein

 said active layer includes at least one quantum well layer containing indium, gallium and nitrogen and at least two quantum barrier layers containing indium, gallium and nitrogen, 10 alternately stacked, and the indium composition ratio of said at least one quantum well layer is larger than the indium composition ratio of said at least two quantum barrier layers.

15 17. The semiconductor laser device according to claim 15, wherein

 said first nitride based semiconductor layer further includes a first conductivity type light guide layer provided between said first conductivity type cladding layer and said active layer and a second conductivity type light guide layer 20 provided between said active layer and said second conductivity type first cladding layer.

18. The semiconductor laser device according to claim 3, further comprising:

25 a third nitride based semiconductor layer, formed on said

current blocking layer and said second nitride based semiconductor layer, containing at least one of boron, aluminum, gallium, indium and thallium.

5 19. The semiconductor laser device according to claim
18, wherein

said third nitride based semiconductor layer includes
a third cladding layer of said second conductivity type and
a second conductivity type contact layer.

10

20. The semiconductor laser device according to claim 18, wherein

said third nitride based semiconductor layer includes
a second conductivity type contact layer.

卷之三